IN THE CLAIMS

1. (Currently Amended) A shift control method for an automatic transmission provided with a primary shift portion and a secondary shift portion, comprising:

(a) starting shift control for the secondary shift portion by determining control start timing for friction elements of the primary and secondary shift portions based on vehicle operating conditions, if a shift signal is output, at the point of the output of the shift signal, and if shift control for the secondary shift portion is detected, starting shift control for the primary shift portion, and then determining a primary shift portion target change rate for feedback control of the primary shift portion and a secondary shift portion target change rate for feedback control of the secondary shift portion;

(b) performing feedback control of the primary shift portion based on a comparison of ~~according to~~ a change rate of a difference between an input speed and an output speed of the primary shift portion and the primary shift portion target change rate, and the feedback control of the secondary shift portion based on a comparison of ~~according to~~ a change rate of a turbine speed and the secondary shift portion target change rate; and

(c) completing a shift of the primary shift portion, then completing a shift of the secondary shift portion.

2. (Original) The shift control method of claim 1, wherein the step (a) comprises:

determining control start timing of each solenoid valve of the primary and secondary shift portions based on hydraulic pressure exhaust time and initial fill time at the point of the output of the shift signal;

outputting a shift start duty for the secondary shift portion according to the determined control start timing;

determining the secondary shift portion target change rate for the secondary shift portion feedback control, if it is determined that shift control is performed in the secondary shift portion by the output of the shift start duty for the secondary shift portion;

outputting a shift start duty for the primary shift portion, if it is determined that the shift control of the secondary shift portion has been started; and

determined the primary shift portion target change rate for the primary shift portion feedback control, if it is determined that shift control is performed in the primary shift portion by the output of the shift start duty for the primary shift portion.

3. (Original) The shift control method of claim 1, wherein the step (b) comprises:

respectively outputting an initial shift duty for the primary shift portion and an initial shift duty for the secondary shift portion;

performing the primary shift portion feedback control by determining a primary shift portion calibration duty ratio based on a difference between the change rate of the difference of the input speed and the output speed of the primary shift portion and the determined primary shift portion target change rate, and then by outputting a primary shift portion control duty ratio according to the determined primary shift portion calibration duty ratio; and

performing, while the feedback control for the primary shift portion is performed, the secondary shift portion feedback control by determining a secondary shift portion calibration duty ratio based on a difference between the turbine speed and the determined secondary shift portion target change rate, and then by outputting a secondary shift portion control duty ratio according to the determined secondary shift portion calibration duty ratio.

4. (Original) The shift control method of claim 1, wherein the step (c) comprises:

estimating a first time period to completion of a shift of the primary shift portion and a second time period to completion of a shift of the secondary shift portion, and then determining whether the first time period is less than the second time period;

determining whether a shift of the primary shift portion has been completed, if it is determined that the first time period is less than the second time period;

returning to the step (b), if it is determined that the shift of the primary shift portion has not been completed;

determining whether a shift of the secondary shift portion has been completed, if it is determined that the shift of the primary shift portion has been completed;

returning to the step (b), if it is determined that the shift of the secondary shift portion has not been completed; and

completing the shift control, if it is determined that the shift of the secondary shift portion has been completed.

5. (Original) The shift control method of claim 4, wherein if it is determined that the first time period is not less than the second time period, the primary shift portion target change rate is reset to such a value that a time period to completion of the shift of the primary shift portion becomes less than a time period to completion of the shift of the secondary shift portion, and the control process returns to the step (b).

6. (Currently Amended) A shift control method for an automatic transmission that is provided with a primary shift portion and a secondary shift portion, comprising:

(a) starting, if a shift signal is output, a shift in the secondary shift portion, and then starting a shift in the primary shift portion;

(b) performing feedback control for the secondary shift portion based on a comparison of a change rate of a turbine speed and a secondary shift portion target change rate, ~~of output duty ratios for an on-coming friction element solenoid of the secondary shift portion with a goal of achieving a predetermined first input speed change rate,~~ and simultaneously performing feedback control for the primary shift portion based on a comparison of a change rate of a difference between an input speed and an output speed of the primary shift portion and a primary shift portion target change rate; and

(c) completing the shift in the primary shift portion, and then completing the shift in the secondary shift portion.

7. (Original) The shift control method of claim 6, wherein the shift signal is an upshift signal in a power-on state, and the step (a) comprises:

setting a duty ratio of an off-going friction element solenoid for the secondary shift portion to 0%;

setting a duty ratio of an off-going friction element solenoid for the primary shift portion to 0%;

performing an initial fill for an on-coming friction element of the secondary shift portion by setting a duty ratio of an on-coming friction element solenoid for the secondary shift portion to 100% for a specific period of time; and

setting the duty ratio of the on-coming friction element solenoid for the secondary shift portion as an initial coupling duty at a point when the initial fill for the on-coming friction element of the secondary shift portion is completed, and simultaneously repeating a duty on (100% duty ratio) and a duty off (0% duty ratio) of the off-going friction element solenoid for the primary shift portion until a shift start of the secondary shift portion is detected so that a torque capacity ratio of the primary shift portion is maintained to be 1.

8. (Original) The shift control method of claim 7, wherein a point of setting the duty ratio of the off-going friction element solenoid to 0% is determined based on hydraulic pressure discharge time and an initial fill time that are calculated at a point of outputting the shift signal.

9. (Original) The shift control method of claim 7, wherein a start point of the initial fill for the on-coming friction element of the secondary shift portion is determined such that a completion point of the initial fill is later than a point of hydraulic pressure release from the off-going friction element.

10. (Original) The shift control method of claim 6, wherein the shift signal is an upshift signal in a power-on state, and the step (b) comprises:

setting the duty ratio of the on-coming friction element solenoid of the secondary shift portion as an initial duty ratio, and setting the duty ratio of the off-going friction element solenoid of the primary as an initial duty ratio;

performing feedback control of the duty ratio of the off-going friction element solenoid of the primary shift portion, and simultaneously performing feedback control of the duty ratio of the on-coming friction element solenoid of the secondary shift portion; and

performing an initial fill for an on-coming friction element of the primary shift portion.

11. (Original) The shift control method of claim 10, wherein the initial duty ratio of the on-coming friction element solenoid of the secondary shift portion is determined based on an input torque drop caused by a shift start of the primary shift portion.

12. (Original) The shift control method of claim 10, wherein the initial duty ratio of the off-going friction element solenoid of the primary shift portion is determined based on learning of a calibration value according to a difference between a target input speed change rate and a real input speed change rate.

13. (Original) The shift control method of claim 10, wherein start timing of the initial fill for the on-coming friction element of the primary shift portion is determined such that a completion point of the initial fill coincides with an estimated synchronization timing.

14. (Original) The shift control method of claim 10, wherein a time period of the initial fill for the on-coming friction element of the primary shift portion is determined based on learning of a calibration value according to a difference between a present piston stroke value and a previous piston stroke value.

15. (Original) The shift control method of claim 6, wherein the shift signal is an upshift signal in a power-on state, and the step (c) comprises:

performing feedback control of a duty ratio of an off-going friction element solenoid of the primary shift portion so that an input speed of the primary shift portion is slightly higher than a synchronization speed, if synchronization of the primary shift portion is detected;

outputting an initial coupling duty ratio for an on-coming friction element of the primary shift portion after completion of an initial fill for the on-coming friction element of the primary shift portion;

maintaining the initial coupling duty ratio for the on-coming friction element solenoid of the primary shift portion for a specific period of time, and then increasing the duty ratio of the on-coming friction element solenoid of the primary shift portion at a specific rate;

stopping the feedback control for the duty ratio of the off-going friction element solenoid of the primary shift portion, and gradually decreasing the duty ratio thereof to 0%;

stopping the feedback control for the duty ratio of the on-coming friction element solenoid of the secondary shift portion, and then maintaining a specific duty ratio for a predetermined period of time;

completing a shift of the primary shift portion by setting the duty ratio of the on-coming friction element solenoid of the primary shift portion to 100%; and

completing a shift of the secondary shift portion by setting the duty ratio of the on-coming friction element solenoid of the secondary shift portion to 100%.

16. (Withdrawn—Currently Amended) The shift control method of claim 6, wherein the shift signal is a downshift signal in a power-on~~off~~ state, and the step (a) comprises:

setting a duty ratio of an off-going friction element solenoid of the primary shift portion to 0%;

setting a duty ratio of an off-going friction element solenoid of the secondary shift portion to 0%;

repeating a duty-on (100% duty ratio) and a duty-off (0% duty ratio) of the off-going friction element solenoid of the primary shift portion so that a torque capacity ratio is maintained to be 1;

performing an initial fill for an on-coming friction element of the primary shift portion for a specific period of time, and then outputting an initial coupling duty for the on-coming friction element solenoid of the primary shift portion; and

outputting an initial duty for the on-coming friction element of the primary shift portion.

17. (Withdrawn) The shift control method of claim 16, wherein a point to set the duty ratio of the off-going friction element solenoid of the secondary shift portion to 0% is determined such that a torque capacity ratio of the secondary shift portion is maintained to be higher than 1.

18. (Withdrawn) The shift control method of claim 16, wherein a start point of the initial fill for the on-coming friction element of the primary shift portion is determined such that a shift start point of the primary shift portion approaches that of the secondary shift portion as closely as possible.

19. (Withdrawn) The shift control method of claim 16, wherein the initial

coupling duty ratio for the on-coming friction element solenoid of the primary shift portion is determined through learning of a calibration value according to a difference between a target speed change rate and a current speed change rate.

20. (Withdrawn) The shift control method of claim 16, wherein the initial duty ratio of the off-going friction element solenoid of the secondary shift portion is determined through learning of a calibration value according to a difference between a target speed change rate and a current speed change rate.

21. (Withdrawn) The shift control method of claim 6, wherein the shift signal is a downshift signal in a power-on state, and the step (b) comprises:

setting a duty ratio of an off-going friction element solenoid of the primary shift portion to 0%;

outputting an initial duty ratio of an on-coming friction element solenoid of the primary shift portion;

outputting the duty ratio of an off-going friction element solenoid of the secondary shift portion as a value acquired by adding a calibration duty considering a shift start in the primary shift portion to the initial duty ratio of the off-going friction element of the secondary shift portion;

performing feedback control for the duty ratio of the on-coming friction element solenoid of the primary shift portion and feedback control for the duty ratio of the off-going friction element solenoid of the secondary shift portion; and

stopping the feedback control for the duty ratio of the on-coming friction element solenoid of the primary shift portion, and then maintaining a specific duty ratio for a specific period of time.

22. (Withdrawn) The shift control method of claim 21, wherein the initial duty ratio of the on-coming friction element solenoid of the primary shift portion is determined through learning of a calibration value according to a difference between a target speed change rate and a current speed change rate.

23. (Withdrawn) The shift control method of claim 6, wherein the shift signal is

a downshift signal in a power-on state, and the step (c) comprises:

stopping feedback control for a duty ratio of an off-going friction element solenoid of the secondary shift portion, and gradually decreasing the duty ratio thereof to 0%;

completing a shift in the primary shift portion by setting a duty ratio of an on-coming friction element solenoid of the primary shift portion to 100%; and

completing a shift in the secondary shift portion by setting a duty ratio of an on-coming friction element solenoid of the secondary shift portion to 100%.

24. (Withdrawn) The shift control method of claim 6, wherein the shift signal is an upshift signal in a power-off state, and the step (a) comprises:

setting a duty ratio of an off-going friction element solenoid of the secondary shift portion to 0%;

setting a duty ratio of an off-going friction element solenoid of the primary shift portion to 0%;

performing an initial fill for an on-coming friction element of the secondary shift portion for a specific time period, and then outputting an initial coupling duty thereof;

performing an initial fill for an on-coming friction element of the primary shift portion for a specific time period, and then outputting an initial coupling duty thereof;

outputting a maintenance duty ratio for the off-going friction element solenoid of the primary shift portion; and

outputting an initial duty of the on-coming friction element solenoid for the secondary shift portion, if a shift start of the secondary shift portion is detected.

25. (Withdrawn) The shift control method of claim 24, wherein a start point of the initial fill for the on-coming friction element of the secondary shift portion is determined such that a completion point of the initial fill coincides with a hydraulic pressure releasing point of the off-going friction element of the secondary shift portion.

26. (Withdrawn) The shift control method of claim 24, wherein the specific time period of the initial fill for the on-coming friction element of the secondary shift portion is determined through learning of a calibration value according to a difference between a piston stroke value at a point of completion of the initial fill and a piston stroke value at a

previous stage.

27. (Withdrawn) The shift control method of claim 24, wherein a start point of the initial fill for the on-coming friction element of the primary shift portion is determined such that a point of completion of the initial fill coincides with a hydraulic pressure releasing point of the off-going friction element of the primary shift portion.

28. (Withdrawn) The shift control method of claim 24, wherein the specific time period of the initial fill for the on-coming friction element of the primary shift portion is determined through learning of a calibration value according to a difference between a piston stroke value at a point of completion of the initial fill and a piston stroke value at a previous stage.

29. (Withdrawn) The shift control method of claim 24, wherein the initial coupling duty ratio of the on-coming friction element solenoid of the primary shift portion is determined based on a turbine torque.

30. (Withdrawn) The shift control method of claim 24, wherein the initial coupling duty ratio of the on-coming friction element solenoid of the secondary shift portion is determined based on a turbine torque.

31. (Withdrawn) The shift control method of claim 24, wherein the maintenance duty ratio of the off-going friction element solenoid of the primary shift portion is determined such that a torque capacity ratio is maintained to be 0.

32. (Withdrawn) The shift control method of claim 6, wherein the shift signal is an upshift signal in a power-off state, and the step (b) comprises:

outputting an initial duty ratio of an off-going friction element of the primary shift portion and an initial duty ratio of an on-coming friction element of the primary shift portion, if a shift start of the primary shift portion is detected; and

respectively performing feedback control of a duty ratio of the off-going friction element solenoid of the primary shift portion, feedback control of a duty ratio of the on-

coming friction element solenoid of the primary shift portion, and feedback control of a duty ratio of an on-coming friction element solenoid of the secondary shift portion.

33. (Withdrawn) The shift control method of claim 6, wherein the shift signal is an upshift signal in a power-off state, and the step (c) comprises:

performing feedback control of a duty ratio of an off-going friction element of the primary shift portion such that an input speed of the primary shift portion is slightly higher than a synchronization speed, if shift synchronization of the primary shift portion is detected;

stopping feedback control of a duty ratio of an on-coming friction element solenoid of the primary shift portion, then maintaining a specific duty ratio thereof for a specific time period, if the shift synchronization of the primary shift portion is detected, and then increasing the duty ratio thereof at a specific rate;

stopping feedback control of a duty ratio of an on-coming friction element solenoid of the secondary shift portion, then maintaining a specific duty ratio thereof for a specific time period, if synchronization of the secondary shift portion is detected, and then increasing the duty ratio thereof at a specific rate;

stopping the feedback control of the duty ratio of the off-going friction element solenoid of the primary shift portion, and then setting the duty ratio of the off-going friction element solenoid of the primary shift portion to 0%;

completing a shift of the primary shift portion by outputting the duty ratio of the on-coming friction element solenoid of the primary shift portion as 100%; and

completing a shift of the secondary shift portion by outputting the duty ratio of the on-coming friction element solenoid of the secondary shift portion as 100%.

34. (Withdrawn) The shift control method of claim 6, wherein the shift signal is a downshift signal in a power-off state, and the step (a) comprises:

setting a duty ratio of an off-going friction element solenoid of the secondary shift portion to 0%;

setting a duty ratio of an off-going friction element solenoid of the primary shift portion to 0%;

performing an initial fill for an on-coming friction element of the secondary shift portion for a specific time period, and then outputting an initial coupling duty thereof;

performing an initial fill for an on-coming friction element of the primary shift portion for a specific time period, and then outputting an initial coupling duty thereof;

outputting a maintenance duty ratio of the off-going friction element solenoid of the secondary shift portion;

outputting an initial coupling duty ratio for a solenoid valve for the on-coming friction element for the primary shift portion, after performing the initial fill for the on-coming friction element of the primary shift portion for the specific period of time;

outputting an initial duty ratio of the on-coming friction element solenoid of the secondary shift portion, if a shift start of the secondary shift portion is detected; and

outputting an initial duty ratio of the off-going friction element solenoid of the secondary shift portion, if the shift start of the secondary shift portion is detected.

35. (Withdrawn) The shift control method of claim 34, wherein a start point of the initial fill for the on-coming friction element of the secondary shift portion is determined such that a completion point of the initial fill coincides with a releasing point of hydraulic pressure of the secondary shift portion.

36. (Withdrawn) The shift control method of claim 34, wherein the specific time period of the initial fill for the on-coming friction element of the secondary shift portion is determined through learning of a calibration value according to a difference between a piston stroke value at a point of completion of the initial fill and a piston stroke value at a previous stage.

37. (Withdrawn) The shift control method of claim 34, wherein a start point of the initial fill for the on-coming friction element of the primary shift portion is determined such that a completion point of the initial fill coincides with a hydraulic pressure releasing point.

38. (Withdrawn) The shift control method of claim 34, wherein the specific time period of the initial fill for the on-coming friction element of the primary shift portion is determined through learning of a calibration value according to a difference between a piston stroke value at a point of completion of the initial fill and a piston stroke value at a previous

stage.

39. (Withdrawn) The shift control method of claim 34, wherein the maintenance duty ratio of the off-going friction element solenoid of the secondary shift portion is determined such that a torque capacity ratio is maintained to be 0.

40. (Withdrawn) The shift control method of claim 6, wherein the shift signal is a downshift signal in a power-off state, and the step (b) comprises:

outputting an initial duty ratio for an on-coming friction element solenoid of the primary shift portion, if a shift start of the primary shift portion is detected;

performing feedback control of a duty ratio of an off-going friction element solenoid of the secondary shift portion;

performing feedback control of a duty ratio of an on-coming friction element solenoid of the secondary shift portion; and

performing feedback control of a duty ratio of the on-coming friction element solenoid of the primary shift portion.

41. (Withdrawn) The shift control method of claim 6, wherein the shift signal is a downshift signal in a power-off state, and the step (c) comprises:

stopping feedback control of a duty ratio of an on-coming friction element solenoid of the primary shift portion, if shift synchronization of the primary shift portion is detected, and then maintaining a specific duty ratio for a specific time period;

performing feedback control of a duty ratio of an off-going friction element solenoid of the secondary shift portion such that an input speed is slightly higher than a synchronization speed, if shift synchronization of the secondary shift portion is detected;

stopping feedback control of a duty ratio of an on-coming friction element solenoid of the secondary shift portion, if the shift synchronization of the secondary shift portion is detected, and then maintaining a specific duty ratio for a specific time period;

increasing a duty ratio of the on-coming friction element solenoid of the primary shift portion at a specific rate for a specific time period;

increasing a duty ratio of the on-coming friction element solenoid of the secondary shift portion at a specific rate for a specific time period;

completing a shift of the primary shift portion by setting a duty ratio of the on-coming friction element solenoid of the primary shift portion to 100%; and

stopping the feedback of the duty ratio of the off-going friction element solenoid of the secondary shift portion after completing the shift of the primary shift portion, and then completing a shift of the secondary shift portion by setting a duty ratio of the on-coming friction element solenoid of the secondary shift portion to 100%.

42. (Currently Amended) A shift control method for an automatic transmission having a primary shift portion and a secondary shift portion, said method comprising:

starting shift control for said secondary shift portion and determining a secondary target speed change rate;

starting shift control for said primary shift portion after starting shift control for said secondary shift portion and determining a primary target speed change rate;

performing feedback control for said primary shift portion based on a comparison of a calculated speed change rate of a difference between an input speed and an output speed of the primary shift portion and said primary target speed change rate;

performing feedback control of said secondary shift portion simultaneously with said primary shift portion feedback control, the secondary shift portion feedback control being based on a comparison of a calculated change rate of turbine speed and said secondary target speed change rate; and

first completing shifting of said primary shift portion and then completing shifting of said secondary shift portion.

43. (Original) The method of claim 42, wherein said calculated speed change rate comprises a difference between an input speed and an output speed of the primary shift portion.

44. (Original) The method claim 42, wherein said first completing of said primary shift portion and then completing shifting of said secondary shift portion comprises:

estimating a first time period before completion of shifting in the primary shift portion;

estimating a second time period before completion of shifting in the secondary shift

portion;

comparing said first and second time periods;

resetting the target speed change rate for the primary shift portion if said first time period is less than said second time period and repeating performing of said primary shift portion feedback control; and

if said first time period is not less than said second time period, repeating performing of said primary shift portion feedback control and said secondary shift portion feedback control until the primary shift portion shifting completes before the secondary shift portion shifting.